

Midterm Test 1

Circle the letter next to your choice of answer for each multiple-choice question (do not write the letter next to the question).

(1) What is the difference between radio waves and light waves?

- a. Their wavelengths and frequencies are different.
- b. Light waves travel faster than radio waves.
- c. Radio waves are electromagnetic, light waves are not.
- d. All of the above.

(2) How many protons does a hydrogen atom have?

- a. 0.
- b. 1.
- c. 2.
- d. 4.

(3) When a solar eclipse occurs, what phase does the Moon have to be in?

- a. It could be any phase.
- b. First (waxing) quarter.
- c. New Moon.
- d. Full Moon.

(4) What is the shape of a planet's orbit around the Sun?

- a. A perfect circle.
- b. A small circle superimposed on a large circle.
- c. An ellipse.
- d. An ecliptic.

(5) On a day when the Moon is full, at what time will it be highest in the sky?

- a. At sunset.
- b. Around midnight.
- c. In the early morning.
- d. The answer depends on the time of year.

(6) Which of the following is due to the fact that the Earth's axis is tilted with respect to its orbit?

- a. The changing of the seasons on Earth.
- b. The fact that the poles are colder than the equator.
- c. The difference between solar and sidereal days.
- d. The fact that solar eclipses are very rare.

(7) What is special about the star Polaris?

- a. It is the brightest star in the sky.
- b. It is the closest star to the Earth.
- c. It is the only star that does not appear to move as the Earth rotates.
- d. It is the only star that can be seen from anywhere on earth.

(8) Why is Newton important in the history of astronomy?

- a. He made excellent observations of the planets' positions.
- b. He developed the heliocentric model of the solar system we still use.
- c. He explained the orbits of planets in terms of gravity.
- d. He was the first person to use a telescope to make astronomical observations.

(9) Why do stars "twinkle"?

- a. Because they are burning spheres of hot gas.
- b. Because of their slow motion across the sky.
- c. Because of the scattering of starlight caused by Earth's atmosphere.
- d. Because sometimes one of their planets passes in front of them.

(10) What is the ecliptic?

- a. The time at which an eclipse will occur.
- b. The point straight above us on the celestial sphere.
- c. The line along which the Sun moves on the celestial sphere.
- d. A small circle on which a planet moves, in a geocentric model.

(11) Where do the names for the seven days of the week come from?

- a. Seven important people in the Bible.
- b. Seven important people in the Koran.
- c. The Sun, Moon, and the planets known in antiquity.
- d. The seven visible stars in the Pleiades cluster.

(12) Why do stars move across the sky overhead throughout the night?

- a. Because the Earth revolves around the Sun.
- b. Because the stars rotate around their axis.
- c. Because the Earth rotates around its axis.
- d. Because the stars revolve around the Sun.

~~(13) What is Stonehenge?~~

- a. A cave where paleolithic paintings including stars were found.
- b. A place in Wyoming where the Indians built a Medicine Wheel.
- c. A circular structure of tall stones in Southern England.
- d. A prehistoric era, during which the oldest sites were built.

~~(14) Is the Solar System inside a galaxy?~~

- a. Yes, the Sun is one of billions of stars in the Milky Way galaxy, many of which have planetary systems.
- b. Yes, the Sun, the planets and a bright cloud surrounding the Solar System are known as the Milky Way galaxy.
- c. No, it is the other way around: the Milky Way galaxy is contained inside the Solar System.
- d. No, all galaxies including the Milky Way galaxy are extremely far away from us.

(15) Do the stars' positions on the celestial sphere ever change over time?

- a. No, stars can never move from their locations, only planets do.
- b. Yes, because of the stars' motion in space, but only over many years.
- c. Yes, because of the celestial sphere's rotation around its axis.
- d. Yes, because of the Earth's rotation around its axis.

(16) Do the planets' positions on the celestial sphere ever change over time?

- a. No, planets never move from their locations, only stars move over time.
- b. Yes, they always move East to West because of the celestial sphere's rotation.
- c. Yes, they always move West to East because of the Earth's rotation.
- d. Yes, they slowly drift West to East except in periods of retrograde motion.

(17) What are solstices?

- a. The days when day and night are equally long.
- b. The longest and shortest days of the year.
- c. The occasional alignments of the Earth, Moon and Sun.
- d. The paths that the planets followed according to old models.

(18) Which ancient Chinese contributions to astronomy do we still use?

- a. Their stone circles built to track the Sun and stars.
- b. The extensive records they kept of events in the sky.
- c. The theories they introduced for the motion of planets.
- d. Their mathematical tools and names for many stars and constellations.

(19) When gravity makes a ball fall toward the Earth, does the Earth also feel attracted toward the ball?

- a. No, the Earth only produces gravity, it is not subject to it.
- b. No, the Earth is only subject to the gravity of larger bodies like the Sun.
- c. Yes, it feels the same force and moves just as much as the ball does.
- d. Yes, it feels the same force, but it is hardly affected because of its huge mass.

(20) What is the main reason why lunar and solar eclipses cannot be seen every month?

- a. Because sometimes the weather is cloudy.
- b. Because the Moon's orbit is tilted with respect to the Earth's orbit.**
- c. Because the Earth's rotation axis is tilted.
- d. Because we are sometimes facing a different direction in the sky when they occur.

(21) What is parallax?

- a. The apparent displacement of an object when the observation point changes.**
- b. A situation in which the Earth's axis and the Moon's axis are parallel.
- c. A method for measuring the angular size of an object.
- d. A method for aligning a telescope with the Earth's axis.

(22) What astronomical phenomenon is related to the fact that years are 365 days long?

- a. The Earth's rotation around its axis.
- b. The Moon's orbit around the Earth.
- c. The Earth's revolution around the Sun.**
- d. The planets' apparent motion on the celestial sphere.

(23) What causes high and low tides along the coasts of Earth's oceans?

- a. The Earth's revolution around the Sun.
- b. The gravitational attraction by the Moon.**
- c. The apparent retrograde motion of Mars.
- d. The fact that the Earth's axis is tilted.

(24) How did Ptolemy explain Mars' retrograde motion?

- a. Using the concept of parallax.
- b. Using the gravitational attraction of other planets.
- c. Using the concept of epicycles.**
- d. They assumed that its rotation axis was tilted.

(25) How did Copernicus model explain Mars' retrograde motion?

- a. Mars' orbit around the Sun is not a circle but includes epicycles.
- b. Mars feels a gravitational attraction towards other planets.
- c. The Earth moves along its orbit around the Sun faster than Mars does.**
- d. It is not really there, the idea was based on wrong observations.

(26) What causes a solar eclipse to be annular rather than total?

- a. The Earth's tilt bringing us closer to the Sun during the Summer.
- b. The Moon being slightly further away, so it doesn't cover the whole Sun.**
- c. The Sun being brighter than usual, so we see it glowing behind the Moon.
- d. The viewer being at the wrong location on the Earth's surface.

(27) What is a molecule?

- a. An atom that has lost one or more protons.
- b. The smallest unit of a chemical substance, made up of two or more atoms.**
- c. The smallest known unit of matter, obtained by splitting an atom.
- d. An atom that has captured one or more photons.

(28) What force attracts protons and electrons and keeps them together to form atoms?

- a. Gravity.
- b. The electric force.**
- c. Inertia.
- d. The force of friction.

(29) Why was Tycho Brahe's observation of a supernova important?

- a. Because it was the first time ever a supernova was recorded.
- b. Because it showed that distant objects, beyond the Moon, can change.**
- c. Because it was evidence in support of the geocentric model.
- d. Because it showed how good the telescope he used was.

(30) Does the speed of a planet along its orbit vary?

- a. Yes, it moves faster when it is closer to the Sun.
- b. Yes, it moves faster when it is farther from the Sun.
- c. Yes, it moves faster when it is moving toward the Sun.
- d. No, each planet always moves at the same speed.

(31) Which one of the following is larger?

- a. A water molecule.
- b. An oxygen atom.
- c. An electron.
- d. A proton.

(32) Today we believe in a heliocentric view of

- a. The Solar System.
- b. The universe.
- c. Both of the above.
- d. None of the above.

(33) Astronauts seem to float inside a spacecraft while orbiting the Earth. Why does that happen?

- a. Because their mass becomes zero in space.
- b. Because they are not subject to Earth's gravity.
- c. They are in free fall with the spacecraft, as if weightless.
- d. Both their mass and their weight are zero in space.

~~(34) Which ancient people first emphasized the need for developing models to explain the way planets move?~~

- a. The Mesopotamians.
- b. The Egyptians.
- c. The Greeks.
- d. The Chinese.

(35) Why do planets that are far from the Sun take longer to orbit around it?

- a. The amount of time is actually the same, but it appears longer as seen from here.
- b. Because at large distances from the Sun the force of gravity slows them down.
- c. Because they have to cover a longer distance to complete each orbit.
- d. Both because their orbits are longer and because they move more slowly.

(36) What causes a solar eclipse to occur?

- a. The Moon passing through the Earth's shadow.
- b. The Earth passing between the Moon and the Sun.
- c. The Moon passing between the Earth and the Sun.
- d. The Sun passing between the Earth and the Moon.

(37) Which of these types of waves has the longest wavelength?

- a. Gamma rays.
- b. Visible light.
- c. Microwaves.
- d. Radio waves.

(38) In what do the Zodiac constellations differ from the others?

- a. They are the ones that represent animals.
- b. They are located along the celestial equator.
- c. They are located along the Sun's path in the sky.
- d. They are the ones in which the planets are located.

(39) At which of the following points along its orbit will we see Mars moving in retrograde motion?

- a. When it is at the same distance from the Sun as we are.
- b. When it is in the opposite direction from the Sun, at the farthest point from us.
- c. When it is aligned with the Earth on the same side of the Sun, nearest to us.
- d. Retrograde motion can happen at any of the above points.

(40) What important fact did Galileo's observation of the Milky Way show?

- a. Stars are far more numerous and distant than previously thought.
- b. All stars in the Milky Way revolve around the Sun.
- c. The Milky Way is similar to many other galaxies in the sky.
- d. Aristotle's and Ptolemy's ideas on the universe were correct.